



Noxious Times

a quarterly publication of the California Interagency Noxious Weed Coordinating Committee

SPECIAL EDITION

In this issue: A look at a Draft of the **California Noxious and Invasive Weed Action Plan**

What is the Draft Action Plan? - In this plan, strategies for the control of noxious and invasive weeds were reviewed and developed. The following pages contain lists of *Selected Actions and Comprehensive Needs* for the future of noxious weed management. The section titled *Selected Actions* will promote and enhance on-the-ground prevention and control. The list of *Comprehensive Needs* represents the future actions and elements that can be attained with a major increase of activity and funding.

- § This plan will focus on *terrestrial species*; there is currently a state plan being written for aquatic invasive species, under the direction of the California Department of Fish and Game. These two plans are intended to be complementary. However, much of the content in this plan is general in nature and applies to noxious and invasive weeds regardless of habitat.
- § This plan will focus on *noxious* and *invasive* weeds. **Noxious** weeds are regulated by the California Department of Food and Agriculture. An **invasive** weed is a concept which is less clearly defined, but is generally thought to be weed species which 1) invade and dominate natural or economic landscapes that are not intensively managed or disturbed, and 2) cause significant economic or ecological damage. Many weeds are considered both noxious and invasive.
- § Weeds of intensively managed or disturbed areas are not expressly the focus of this plan. This includes urban landscapes and intensive or row-crop agriculture.



The Invasive Weed Summit Meeting

was held April 2, 2003 in Sacramento. The event pulled together representatives of agencies, interest groups, and industry, to brainstorm specific needs and actions for the draft document of the state's new action plan. The event began with some excellent background talks, but mainly consisted of highly focused "breakout" group sessions, which resulted in refined material for each topic.

Who developed the Draft of the Action Plan? The need for this plan was



conceived by the California Invasive Weed Awareness Coalition (CalIWAC). The CalIWAC endeavors to increase awareness about noxious and invasive weeds and seeks to increase resources for prevention and control. The CalIWAC enlisted the California Department of Food and Agriculture to take a lead role in the formulation and production of the plan. The CDFA put together a steering committee which comprised a cross section of agencies and interests that developed a process for soliciting broad input from a cross-section of California. The California Noxious and Invasive Weed Summit, a statewide meeting, was held on April 2, 2003 in Sacramento. Breakout groups formed the core activity at the meeting resulting in the lists of candidate *selected actions* and *comprehensive needs* grouped according to category.

Objectives of the Plan

The Steering Committee, in advance, identified a number of objectives for the production of this planning effort.

1. Harmonize regulatory issues and obstacles.
2. Increase coordination and harmonization of existing programs.
3. Serve as an analysis of gaps in authority, implementation and funding.
4. Be a blueprint for funding enhancements.
5. Promote innovation.
6. Emphasize prevention.
7. Promote partnerships.
8. Prioritize issues and processes.
9. Emphasize early detection and rapid response.
10. Highlight what can be achieved.
11. Identify regulatory obstacles and solutions.
12. Promote clear objectives, monitoring, accountability, and measurements for weed management projects.

Major Themes in the Plan

During the Weed Summit a number of common major themes emerged from the separate breakouts and subsequent synthesis. They are areas in need of discussion, analysis, and action.

1. The need for more funding.
2. There is no agency lead or comprehensive program for non-noxious weeds.
3. Environmental compliance can be crucial to rapid implementation; Regulators need engagement.
4. Need economic analyses, cost/benefits and impact research.
5. Invasive ornamentals must be seriously addressed.
6. Mapping and Inventories crucial.
7. Weed education is non-coordinated and should be stepped up.
8. Weed Management Areas are key: must be supported and funded.

Your Input needed for the Final State Weed Plan

The previous sections list and describe the different objectives of the new State Weed Plan. Each topic area includes the two sections: **"Comprehensive Needs"** and **"Selected Actions"**. The function and format of these two section types are defined as follows:

Comprehensive Needs – Here we are imagining that resources for invasive weed control have taken a major increase. Think of this as the "wish list" for each weed control topic.

Selected Actions – Here we look at what we can do right now with existing resources. The plan will look at ways to work more strategically and more cooperatively.

You can download a full copy of the draft plan at: www.cdca.ca.gov/phpps/ipc/noxweedinfo. Please review the following pages and consider if there is anything you would add or change. Please email Steve Schoenig with any comments about this draft by **February 15, 2004**. sschoenig@cdca.ca.gov

Leadership and Coordination

In California, there are many weed control efforts involving thousands of people in all sectors of society. These extensive efforts are dependent on coordination and collaboration among the many levels of organization, from the on-the-ground weed managers to those working to support them.

Current Program

The California Department of Food and Agriculture is designated the state's lead agency in noxious weed control. CDFA has several roles—the department (1) maintains the list of officially designated noxious weeds, and regulates the movement and commerce for these weeds, (2) implements the “Pest Prevention System,” (3) coordinates eradication efforts for high priority (A-rated) noxious weeds, and (4) provides funding, oversight and guidance to county-based weed management areas (WMAs).

Comprehensive Needs

1. A statewide goal or vision statement.
2. Weed issues higher in relative statewide political importance.
3. Greater leadership from high-level management in CINWCC agencies.
4. More non-governmental stakeholders into leadership and coordination roles.
5. More coordination between agencies and non-governmental organizations, professional associations, private businesses, and water associations.
6. A lead agency for non-noxious weeds, and address other regulatory gaps for these weeds.
7. More participation of relevant agencies in each Weed Management Area through internal agency mandates, incentives and outreach.
8. Implementation of this action plan through federal, state, and local agencies (landholding and regulatory) and private organizations.

Selected Actions

1. Review and evaluate the progress of this plan biennially. (CDFA, CINWCC, CALIWAC)
2. Designate a lead person at each agency for implementation of this plan. (CINWCC)
3. Increase meeting attendance and general participation by all signatory agencies of (CINWCC).
4. Designate one meeting per year to be mandatory as state in the MOU. (CINWCC)
5. Schedule CINWCC and CALIWAC meetings on half days during the same day to facilitate interchange between the two groups. (CINWCC, CALIWAC)
6. Form a California Weed Management Area leadership council to foster communication and coordination between Weed Management Areas. (CDFA, CWMALC)
7. Cultivate legislative outreach, awareness and leadership. (CALIWAC)
8. Formally endorse this state weed action plan. (CDFA, CINWCC, CALIWAC, SW SWPS SWPSC)
9. Expand CINWCC to include other agencies that may be doing state or regional control projects or relevant regulation. (CINWCC, CALIWAC)

Prevention/Exclusion

The first-line of defense and, over the long term, the most cost-effective strategy against invasive species is preventing them from becoming established. Prevention, early detection, and eradication of newly arrived noxious weed species are the most practical and economical means of weed management. Prevention is accomplished by ensuring that seed or reproductive plant parts of new weed species are prevented from being intentionally or unintentionally introduced to an area. Prevention also involves an understanding of which lands are most susceptible to invasion of noxious and invasive weeds. Prevention is two-pronged because some species are intentionally introduced for a specific purpose, whereas others arrive unintentionally as “hitchhikers” on a commodity, conveyance, or person. Diverse tools and methods are needed to prevent invasive species from becoming established in ecosystems where they do harm.

Current Programs

CDFA’s Pest Prevention System - CDFA’s pest programs are developed according to national and international plant quarantine laws and standards. CDFA has made significant contributions to the development of many of these policies and standards through participation in various national, regional, and international organizations. The Department coordinates its various invasive plant and non-native invasive pest programs through an internal organizational structure based on major program elements.

Comprehensive Needs

1. A comprehensive list of prevention practices.
2. An emphasis on prevention in all awareness and education programs. More pamphlets, brochures and workshops.
3. Adequate funding for prevention programs and/or incentives.
4. Identify specific pathways of weed spread with a focus on prevention.
5. Conduct a species risk analysis of impacts (pathway, habitat, economic).
6. Develop a comprehensive manual of pathways and oriented prevention practices. (CINWCC)
7. More recognition of invasive plants by the general public encouraged through education and outreach.
8. Reduce noxious weed seeds along canals, ditches, highways and roads.
9. Protect California at all important points of entry against the inward movement of noxious and invasive species.
10. A central clearinghouse for weed prevention measures and information
11. Removal of invasive plants from the nursery trade and compliance with existing commercial regulations
12. Identification of weaknesses in the current exclusion program. Identify and replicate successful achievements.
13. A mandate for washing or cleaning of equipment, machinery and vehicles coming from contaminated areas.
14. Encourage California Weed Management Area cooperators to develop prevention standards and guidelines in integrated weed management plans.
15. Develop and promote voluntary “cleansing” measures to rid noxious weed seed from domestic animals moving from areas contaminated by noxious weeds.
16. Provide incentives for management and prevention in the forms of rebates and referrals.
17. Require the use of weed-free seed and mulch on reforestation, and rangeland rehabilitation projects.

Selected Actions

1. Restore CDFA funding, and increase activities such as the weed and vertebrate program. (CDFA, CALIWAC)
2. Draft and endorse a set of general weed prevention strategies for the state. (CINWCC)
3. Establish a nursery weed task force with involvement from the industry. (Cal-IPC)

Early Detection and Rapid Response

Early detection is the single most important element in successful and economical eradication before new weeds become permanently established in new localities. Early detection will result from the combination of highly trained detection biologists and a large group of more casual “detection partners” who receive short trainings in identification of key species. The detection biologists make systematic surveys of the areas that the state deems high-risk and most probable to become infested with new invaders. They work at a district or statewide level to follow pathways and discover patterns of movement and spread. The “detection partners” can number in the hundreds or thousands and are trained through workshops, articles, brochures and other outreach methods. They are a crucial link in early detection because of the vast area of the state they will traverse in their activities on the land.

Rapid response is essential when a new weed species is discovered in an area and it displays a high potential for developing into a nuisance species. Comprehensive statewide overview is essential to provide authority, establish priorities, and provide adequate funding. However, the actual implementation of the eradication will be accomplished by an agency or group (or combination of both) which specialize in on-the-ground projects.

Containment and eradication activities require focus and commitment, and they cannot proceed efficiently in an environment of complex demands and uncertain requirements. The goal of a model system is to create a consensus-driven decision process, but one where discussions about general strategies occur before the arrival of a new invader. Coordination groups and agencies make decision as to the general course of action when a new weed arrives. This decision provides the on-the-ground manager clear goals to begin work. Because each situation tends to include unique conditions related to the species and the environment, the general rapid response plan needs to be general in nature, and it does not attempt to address regional or national processes.

Probably the two biggest factors limiting true rapid response are adequate funding for new projects and the need for site-specific environmental compliance.

The elements that need to be addressed in a rapid-response include:

- 1) Authority, leadership, and organization
- 2) Coordination and cooperation among parties in the response
- 3) Funding and resources
- 4) Quarantine establishment and enforcement
- 5) Environmental regulatory compliance
- 6) Public awareness and education; outreach to affected property owners and parties
- 7) Delimitation survey and mapping
- 8) Review of biology and controls
- 9) Implementation of eradication or other management methods
- 10) Assessments of treatments and modification if necessary
- 11) Environmental monitoring
- 12) Restoration / mitigation



CDFA's early-detection-crew surveying Alpine County. Summer 2003. Photo by CDFA.

Current Program

- 1) County and CDFA detection biologists, are highly trained and carry out systematic searches in areas of high-risk.
- 2) There are a number of major herbaria with botanists who can identify weeds and know to alert the correct agencies if priority weeds are discovered.
- 3) There has been a dramatic increase in “detection partners” – land stewards who are trained in weed recognition and how to report new invaders.
- 4) Weed Management Areas, agencies, have greatly facilitated the training of “detection partners”.

(Early Detection and Rapid Reponse Continued)

Comprehensive Needs

Education & Outreach	<p>Better pest alert system for non-rated weeds.</p> <p>Better way for public to report finds.</p> <p>Better information on weeds in areas of similar climates.</p> <p>Identify weed taxonomist network.</p>
Organization & Infrastructure	<p>Enhanced detection.</p> <p>ID agency to lead on non-regulatory weeds.</p>
Funding	<p>Obtain sufficient funds for high priority early infestations.</p> <p>Setup short-term emergency funds for quick immediate response.</p>
Ability to Respond Quickly	<p>Establish pre-compliance with environmental regulations before invasion.</p> <p>Better detection methods. Train “passive” detectors.</p> <p>Link rating systems to statutory authority.</p> <p>Define potential pest experts for assessment and response to new introductions.</p> <p>Define economic impact of not responding rapidly to weeds in wildlands and agricultural lands.</p>

Selected Actions

Coordination	<p>Restructure noxious weed rating system. Deal with Q-ratings quickly. (CDFA)</p> <p>Identify and copy successful rapid response programs. (CINWCC)</p> <p>Support funding for trained detection biologists at the state and local level. (CALIWAC)</p>
Funding	<p>Require future WMA plans to direct a min 30% of funds to early detection and rapid response programs. (CDFA, CAWMALC)</p> <p>Investigate legislation for emergency project money. (CALIWAC)</p>
Planning & Compliance	<p>Develop pre-established response plans for selected high-priority species. (CINWCC)</p> <p>Establish environmental compliance task force and produce a guide to environmental compliance for weed control by holding a meeting of responsible agencies. (CINWCC, Cal-IPC)</p>
Education & Outreach	<p>Produce a pamphlet with pictures of the Cal-IPC Red Alert weeds & guide to their identification. (Cal-IPC)</p> <p>Produce pamphlet with pictures of A-rated weeds and guide to their identification. (CDFA)</p> <p>Update CDFA noxious weed detection manual to include new noxious weed and non-regulated weeds of high priority. (CDFA)</p>

Control and Management

Management of noxious weeds in California is divided into three priorities based on the status of the weed in the state. These include:

1. New invaders, which are localized and eradicable (A-rated);
2. Relatively new invaders, which are in some parts of the state but eradicable in other large parts of the state (B-rated);
3. And those that are permanently established and widespread in many areas of the state (only eradicable only in small regions) (C-rated).

Weed management is an effort to reduce, contain or eradicate a weed infestation from a particular area. Integrated weed management (IWM) is a systems approach to weed control that integrates chemical, cultural, physical and biological control methods. Developing an integrated weed management strategy involves a planned, strategic program that may require all methods appropriate for effective control at a specific location. The program includes control objectives (reduction, containment or eradication), the effectiveness of the control technique for the target species, environmental factors, land use, economics, policy and legal restrictions, practicality, safety, and the geographical extent and biological nature of the weed.

Current Program

CDFA operates an A-rated weed eradication program. Although diminished by recent funding reductions, there is still an attempt at a statewide approach to eradicating potentially destructive weeds that are still at a small level of distribution. The County Agriculture Department have traditionally been the lead agency, at the local level, in implementing and coordinating noxious weed control. This leadership has been extended and augmented by the Weed Management Areas, which bring agencies and important partners together to prioritize and coordinate on a regional approach to weed management. In most counties, the Agricultural Commissioner, or their representative, takes the lead role in the formation and administration of the Weed Management Area.

Comprehensive Needs

1. Information and education regarding effectiveness and ineffectiveness of techniques; encourage development and awareness of more application tools and methods; develop thresholds for acceptable levels of control (i.e., add control level categories).
2. Seek clarification and streamlining of environmental regulatory process, including NEPA, CEQA, ESA, NPDES, Air Quality, etc.
3. Expand available resources for WMAs; expand the participation in WMAs
4. Fund and hire WMA coordinator for each county WMA (expand administrative capacity)
5. Encourage and support more coordinated and cooperative control programs. These regional approaches will be more likely to achieve long-lasting results and prevent rapid re-infestation
6. Contain and manage A-rated infestations; encourage more local eradication; set criteria for prioritizing programs/efforts
7. Promote and assist with implementation of IWM programs on all lands; link control strategy with restoration strategy considering management or control as part of a systems process
8. Expand linkages among field practitioners, federal, state and county agencies and private and public land-managers, non-governmental organizations, cities and local governments, tribes, WMAs.

Selected Actions

1. Increase number of field biologists at CDFA to detect and control A-weeds (CALIWAC)
2. Develop a weed management handbook (Cal-IPC, UCCE)
3. Develop a technical resource clearinghouse for landowners (NRCS, RCDs)
4. Develop a weed management sourcebook/resource for landowners (UCCE, NRCS)
5. Create committee for regulatory coordination and streamlining (CINWCC, CALIWAC)
6. Implement weed management, mapping, planning on a watershed scale to support control priorities (WMAs, CDFA)
7. Encourage WMAs to follow Best Integrated Weed Management Practices (CDFA, WMAs)
8. Establish guidelines to evaluate progress and success of WMA operations (WMAs, CDFA)

Inventory, Monitoring and Evaluation

Over the past century, agencies and local departments have been inventorying and mapping priority weed species, usually in connection with specific control projects. This data has been stored on paper maps and in non-digital reports. Over the past decade there has been an increasing trend for the adoption of Geographical Information Systems (GIS) to house, organize and analyze weed location and control data.

With limited budgets for weed management, it can seem hard to justify spending time and money on weed inventories or maps. Wouldn't that time and money be better spent toward actual weed management? The best justification can be found in Steve Dewey's brochure, *Noxious Weeds: A Biological Wildfire*. Dewey applies wildfire management principles to invasive weed management. When fighting fires, the first priority is to contain the fire and extinguish spot fires outside the perimeter of the fire. Trying to fight a wildfire without any idea of its size, direction of spread, rate of spread and other relevant information, would be a much less effective use of the efforts of firefighters (and could potentially jeopardize their lives).

Likewise, trying to manage an invasive weed infestation without relevant information reduces the effectiveness of control efforts and does not optimally utilize time and money. Armed with maps and inventory information, weed managers can develop strategies focused on removing new and isolated infestations while containing the principle infestation—the same strategy used for wildfires. In addition to enabling weed managers to prioritize which part of an infestation to treat first, the use of invasive weed inventories can increase the efficiency of almost any method of weed management. For instance, weed managers might combine weed inventories with information on soil type and water table depth to select the most safe and effective herbicide for a given location. Or they might keep inventory information to help plan and track volunteer weed pulling efforts. No, inventories and maps will not themselves kill weeds, but they are invaluable planning tools that help get the most out of limited weed management dollars.

No matter what tool is used to manage weeds, follow-up monitoring should be done to evaluate the effectiveness of the efforts and to make sure the area has not been re-infested. Many county weed supervisors know from personal experience where weed infestations in their county are located. Failure to capture this information in formal databases, puts the information at risk of leaving with the individual. By putting this information onto paper maps or into computer databases, weed management efforts can continue past the duration of a particular person's career, or allow the efforts to be effectively spread among a larger team all working in coordination at the same time. One of the most important benefits of weed inventories lies in their use as a tool for generating awareness. If a picture is worth a thousand words, a map is worth a thousand reports. Whether the audience is county commissioners, state legislators, congressmen, special interest groups, or the general public, being able to tie the problem back to their geographic area of interest dramatically increases their receptiveness and interest in the problem.

One of the key needs for weed management programs is to quantify the impact of invasive weeds in order to prioritize funding for weed control programs. Currently, encroachment by invasive species is the second largest contributor to native species becoming threatened and endangered (direct habitat loss from development is number one). Invasive weed inventories provide the data necessary to further quantify impacts of invasive weeds on native ecosystems.

Current Program

Some very good information sources for weed information are currently available. **Some websites with pertinent content are:**

The Weed Research Information Center (<http://wric.ucdavis.edu/>)

The California Regional Invasive Species Information System (<http://cain.nbii.gov/crisisindex>)

The Nature Conservancy (<http://nature.org/>)

California Invasive Plant Council (<http://www.caleppc.org/>)

CDFA's Weed Information Project - Encycloweed (<http://pi.cdfa.ca.gov/weedhome/links.html>)

The CalWeed Weed Project Inventory Database (<http://pi.cdfa.ca.gov/weedhome/calweed.html>)

Calflora (<http://www.calflora.org>)

Mapping is important on many scales. On the regional level, local groups might share their maps and inventory data to inform coordinated control efforts. And on a state level, the collective data from all local groups can help assess the extent of particular weed problems. To facilitate this type of interaction between different data sets, weed mappers need "shared data standards." These are general formatting and content guidelines that make sure everyone collects at least a certain basic set of data, and records it in a way that will be easy for others to use as needed. This effort is not intended to create a single master database, but rather to create many databases throughout the state with minimum standards so that all information being collected is compatible. There will be many ongoing needs and opportunities to bring together local data for statewide, national, or even global maps.



Placer County biologists monitoring musk thistle at Boca Reservoir. Photo by CDFA

Comprehensive Needs

Inventory	<p>Create a complete inventory of all the high priority weed infestations in the state and map them in a digitalized form.</p> <p>Identify gaps in data and mapping frequency and in data collection and quality.</p> <p>Develop a GIS-based resource and contact list. (ie weed resources by region)</p> <p>Direct the focus of information to early detection, tracking and inventory for regulatory and permitting, and focus of threat to money, the economy and sensitive resources.</p> <p>Develop a comprehensive website explaining regulatory compliance needs and methodologies.</p> <p>Complete the inventory of all public and coordinated weed control projects in the state. (CalWEED)</p> <p>Establish one or a complementary set of web sites needed to pull together all available information on weeds and weed control in California.</p> <p>When mapping weeds collect data on habitat type, or land use type.</p> <p>Funds for local level inventory.</p> <p>Measure density change as environmental change indicators.</p>
Monitoring	<p>Determine the ability to show the efficacy or public and coordinated projects with objective performance measure.</p> <p>Track abatement work projects.</p> <p>Track benefits on a site.</p> <p>Create a central, widely available clearinghouse for GIS, monitoring and WMA information.</p> <p>Evaluate tracking successes of old and existing projects and update them if need be.</p> <p>Include the category of economic production in the weed goals when appropriate.</p> <p>Develop (minimum standards) standardized monitoring-public and private—with simplified standards.</p>
Funding	<p>Economic data—cost-benefits analysis of various control strategies.</p> <p>Inform legislators as to numbers, data.</p> <p>Identify what potential funders and legislators want mapped.</p>

Selected Actions

Inventory	<p>Finalize the A-rated noxious weed inventory statewide. (CDFA, CACASA, WMAs)</p> <p>Conduct training sessions to teach mapping strategy and explain the mapping handbook. (CDFA, Steering Comm)</p> <p>Coordinate weed information projects between WMAs and watershed groups. (CALFED, CDFA, Regional Water Quality Control Boards, CalEPA)</p> <p>Hold annual ad hoc Weed Mapping Steering Committee meetings. (CDFA, CINWCC)</p> <p>Develop risk maps for important species. (CDFA, UCD, Cal-IPC)</p> <p>Finalize the CA weed mapping handbook with sections on ethics and section on legal mapping issues. (Weed Mapping Steering Comm., CDFA)</p> <p>Each WMA should maintain a weed inventory of priority weeds, accessible through GIS. (WMAs)</p>
Monitoring	<p>Form weed monitoring committee/work group. (UCCE, CDFA, CINWCC)</p>
Information	<p>Model/guide for local cost/benefit analysis by species and by method. (Univ. Nevada, CDFA, UCCE, USDA/ARS)</p> <p>Support funding for the CalFlora database of California plant information. (CINWCC, CALIWAC)</p> <p>Revitalize the CalWEED database for sharing weed project data. (CINWCC, CDFA, UCD-ICE)</p>

Restoration

Restoration is the process of repairing damaged or degraded ecosystems and agricultural land. Invasive plants are one of the primary factors that degrade both natural and working landscapes. Thus, restoration and the control of invasive plant species go hand in hand, particularly in terrestrial ecosystems. It is increasingly understood that you cannot restore native species and revegetate native habitats unless you successfully control invasive weeds.

The development of ecological restoration methods has grown tremendously in recent years. As the public becomes more environmentally informed and concerned, they have been increasingly willing to mandate the repair of damaged landscapes. Large-scale projects like CalFed and the Tahoe Regional Planning Process are some of the more ambitious restoration projects in the state. At the same time, citizens are getting involved in local volunteer efforts as watershed stewards. Restoration expertise and funding for restoration have grown rapidly in recent years.

Restoration consists of several tiers of activity:

1. The first step is determining the goals of the restoration process. These goals may be limited to particular ecosystem services, such as erosion control or improved livestock forage, or they may be as ambitious as the faithful recreation of the "original" ecosystem in a preserve. The latter requires determination of what species—or even what genotypes of species—are native, what elements comprised the original ecosystem, and the range of conditions within the ecosystem. These tasks can be very difficult.
2. Next, it is often necessary to prepare the site. This may include removal of degrading forces, remediation of the soil, and controlling invasive plants. In many Western ecosystems, non-natives invasive plant species remain one of the most daunting impediments to successful ecological or agricultural restoration.
3. Next enrichment seeding and the planting of desired plant stock (native or non-invasive exotics). Sometimes appropriate site preparation is sufficient for the natural regeneration of a native ecosystem. More often, however, restoration projects assist this process through active reseeding and planting seeds from local sources. These plantings may be accompanied by allied activities such as irrigation, fertilization, protection from herbivory and competition, and soil inoculation.
4. Finally, successful restoration requires ongoing monitoring and appropriate maintenance of the site.

Management of invasive plants is often an integral part of each of these four stages of restoration. Ongoing progress in ecological restoration will be closely related to advances made in weed science, practitioner skill, and land manager coordination (above text adapted by Doug Johnson from an article By Dr. Truman Young UC Davis)

Current Program

Restoration of sites that have been highly transformed by invasives to predominantly native or beneficial cover can be expensive and labor intensive. There are a number of restoration projects ongoing in many parts of the state. Many of these projects are at sites where the main disturbance and ecosystem stressor was invasive weeds.

Restoration science is still at an early stage of maturity. The following questions are pertinent to determining a statewide restoration strategy.

How often do restoration projects attain their desired outcomes? (% success)

How do you measure success (species composition, ecosystem function, stability over time)?

Is there a demonstrated weed repelancy of restored sites?

Are certain habitats more successfully restorable?

What are the time frames over which restorations projects need to monitored?

How much money (\$/acre - inclusive of labor) does successful restoration cost? [if variable, what does cost correlate with?] What is the availability of local seed and plant stock? How local does local have to be?



Previously infested with yellow starthistle, this grassland in Yolo County was restored with native grasses. Photo by CDFG.

Comprehensive Needs

Funding & Outreach	Develop a resource guide for funding restoration activities.
Guidance/Resources for Restoration Planning	Develop niche-specific information for habitat restoration / regulate sources of local genetic stock so they are trackable. Incorporate re-vegetation into planning from the start, identify native species to use.
Monitoring & Maintenance	Establish, fund and implement guidelines to prevent weeds from reinvading revegetation and restoration projects. Identify a restoration coordinator to work on a national level to refine the nomenclature for the stages of restoration & what is “successful”.
Regional Coordination & Outreach	Identify collaborators for mutual benefits. Identify statewide outreach & restoration coordinator. Answer questions about revegetation and restoration on this page.
Project Guidance & Evaluation	Develop guidelines to determine when a weed control project should be followed up with revegetation/restoration efforts. Develop field methods for rapid site assessment of implemented restoration. Evaluate success of restoration plantings. Develop list of mitigation banking resources. Develop policy for rigorous monitoring in each revegetation project. Identify sources of technical information for restoration.
Permitting & Regulatory Compliance	List typical regulatory requirements.
Planning	Plan for anticipated problems. (ie: extent of the seed bank) Address urban constraints.
Site Assessment	Rapid site assessment tools.

Selected Actions

1. Develop site-specific list of genetically appropriate native stock for revegetation projects. (NRCS, CNGA, SERCAL)
2. Develop a guide for weed control issues in restoration projects and develop a guide to habitat restoration following weed control projects. (Cal-IPC, SERCAL)

Research

Research provides the scientific foundation for sustainable weed management. Weed control has a long history, but there are many areas that are currently evolving rapidly. Those evaluating wildland weeds, for example, are asking new questions about the ecological roles of plants, and the effects of restoration. Research is called for on a number of fronts.

In order to assess and prioritize the risks posed by invasive plants, it is important that we know as much as possible about their biology and ecology. There is a dearth of well-quantified information on the economic and ecological impact of weeds. This information is essential for obtaining funding to address the impacts.

Those working to control weeds also need good information on control methods. Some of this information can come from the experience of practitioners themselves. To make that information useful to others requires a good network of communications. Much of the information, however, requires the resources and expertise of agency and university scientists.

There are many research areas particular to the issue of weeds. One major question is whether specific plants could be invasive or not. This is the case with cultivars of known invasives developed by the horticultural industry to be less invasive. Such assessment requires independent testing. Similarly with control methods—these are best tested independently.

Another area where research is crucial is the development of biological control agents. Such research involves international cooperation in order to work in the home region of an invasive plant, as well as specialized quarantine facilities and highly-trained scientists. When successful, these programs can provide excellent long-term control for widespread weeds.



Current Program

California is especially rich in research institutions, which have the scientists capable of conducting practical on-the-ground research. Listed below are some of the major institutions conducting research on weed control: University of California, California State University, California Community College System, Private colleges and institutes USDA-ARS and NRCS, US Geological Survey, Biological Resources Division, other federal and state agencies, and private industry.

California has not produced a set of research needs or priorities in a coordinated fashion. Most weed researchers form their own research priorities through stakeholder meetings, requests from practitioners, discussion with colleagues, and their own observations.

Montana has set an instructive example of what can be done with a coordinated approach to identifying a global set of weed research priorities and assessing the funding needed to conduct the studies. The Montana Weed Research Task Force, which included on-ground land managers, developed the list of high-priority research projects that might be undertaken cooperatively by scientists from varied disciplines and agencies in the state. The priorities were divided into six research categories to meet management needs: impacts, prevention, weed biology and plant community dynamics, integrated weed management, revegetation and restoration, and effects of natural disasters (e.g. fire, flood, drought) on noxious weeds. The amount requested to fund these extensive research projects was \$12.6 million. This figure represents the total cost of conducting various research projects, not an annual budget. Research will be a cooperative effort, with the expectation that a portion of the funding and support will come from partner in-kind contributions of time, facilities, and other resources. Working together, Montana's scientific community hopes to make significant advances in weed management and the application of knowledge to invasive plant problems in the field. With extensive research capabilities, California is well positioned for pursuing such an ambitious research program.

Comprehensive Needs and Research Topics

Impacts	<p>Economic impact studies of invasive weed.</p> <p>Ecological impact studies of invasive weeds.</p> <p>Cost/benefit analysis of eradication projects.</p>
Restoration	<p>Research on environmental characteristics that promote desirable vegetation.</p> <p>Identify and develop desirable or natives species for restoration. (grassland, riparian, etc)</p> <p>Study long-term landscape-scale impacts and approaches.</p> <p>Integrating control and restoration efforts optimizing ecological values from infested areas.</p>
Control/Management	<p>Basic biology & ecology of target weeds.</p> <p>Increase exploratory effort for invasive plants in foreign countries/ biological control agents.</p> <p>Herbicide evaluation programs.</p> <p>Increase funding for control tools of A-rated weeds.</p> <p>Develop methods to measure success of control projects.</p> <p>Research on other mapping techniques.</p>
Rapid Response & Detection	<p>Research on weed detection methods (Remote sensing).</p> <p>Systematics through morphological and DNA studies.</p> <p>Develop risk assessment models for potential invasions.</p> <p>Study pathways of introduction.</p> <p>Identify plants overseas that may be invasive to California.</p>
Resources for Research	<p>Include economists, hydrologists, plant pathologists, fish & wildlife biologists, entomologists, ecologists and land managers in invasive weed research.</p> <p>Establish competitive grant program for invasive weeds. Especially collaborative research on various aspects of invasive plants impacts.</p> <p>More funding for research and more researchers.</p>

Selected Actions

General	<p>Include and expand weed systematics in University of California's proposed Biosystematics Center (UC).</p> <p>Establish a weed research working group that will identify areas of research, current resources, and new funding sources. (The group should comprise resource managers, agency representatives and researchers). (CINWCC)</p> <p>Organize workshops that bring multi-disciplinary research interests together to establish links and facilitate interaction (CWSS, UC, USDA)</p> <p>Promote the inclusion of the UC in research on biological control for invasive plants (UC,CDFA,USDA-ARS)</p>
Resources for Research	<p>Develop and maintain a database to identify current research projects directed at noxious and invasive weeds (CWSS, UC Ext., USDA-ARS)</p> <p>Earmark a portion of statewide funding for research (CALIWAC)</p> <p>Pursue legislation to provide funding for biological control research and implementation. (CALIWAC)</p> <p>Pursue legislation for a state or federal weed research funding programs where researchers could submit proposals for needs-based funding (CALIWAC)</p>

Education and Public Awareness

Education outreach is one of our best tools in preventing new noxious and invasive species introductions and in preventing further spread. Education outreach in California is a challenge due to the diverse communities and geographically unique areas and population centers. Additionally, education of land managers across the state is an immense task. The development of several unique products, with proper marketing could greatly improve the public's recognition of the threat of weed invaders. The goal would be that Arundo or yellow starthistle would be as recognizable as Smokey the Bear.

In general, citizens and landowners in the state have little to no understanding of how the spread of noxious and invasive weeds negatively impact the environment, economy, and natural resources so important to them. Weed management still tends to be viewed as an issue exclusive to more traditional row crop agriculture and front lawns, rather than an integral part of natural resource management activities: outdoor recreation, fire, wildlife, wilderness, grazing, timber, maintenance of transportation corridors, and urban area management. Increased actions from local, state, and national officials in making noxious and invasive species a priority requires greater awareness and understanding from California citizens and landowners.

Current Program

Many if not most noxious and invasive species programs have included an element of public outreach in their projects. These have been well done efforts but are not often conjunction with county or statewide campaigns. There have been some good statewide projects focusing specifically on education and awareness about noxious and invasive weeds. These well done efforts could be magnified and leveraged into a statewide program with a coordination group that was funded and tasked to create a California campaign. The CALIWAC has created an Education subcommittee which is a step in the direction of coordinating, fostering and prioritizing weed education.

Comprehensive Needs

Funding	Identify and develop funding sources for awareness projects. Fund a statewide coordinator.
Target Audience	Audience specific messages and materials. Staff training. (field personnel) Need to target the "green" industries.(ie landscapers, nurserymen). Educate regulators. Identify target audience and create messages that are appropriate. Include this message in continuing education for licensing and certification.
Message Content	Establish messages and outcomes. Create audience-specific materials. Develop statewide identification "logo" and mascot. Develop templates & example materials—on the templates, include logo and mascot. Create a set of standards for evaluating the efficacy of education projects. Review and copy successful educational materials and programs. Produce a guide for how to run an awareness campaign (at the local level for WMAs and others, and statewide program).

Structure & Outreach

Incorporate weed awareness into appropriate events (farm show, earth day).
 Centralized web site.
 Inventory and coordinate current educational materials and programs through developed web-based data systems.

Coordination

More coordination among the current efforts in public awareness.
 Identify list of cooperators, including higher education.
 More expertise and activity at the local WMA level.

Selected Actions

Distribute education materials to targeted venues/audiences. (All)

Target/make a list of audiences and engage them, including traditional and non-traditional groups. (CALIWAC Ed Comm)

Promote CA weed awareness week. (CALIWAC Ed Comm)

Write grants for educational outreach infrastructure. (Cal-IPC, CDFA, WMAs)

Develop more centralized and comprehensive website. (CALIWAC Ed Comm)

Hold a yearly weed education coordination meeting. Prioritize top outreach messages and educational needs. (CALIWAC Ed Comm., CINWCC, resource agencies)

Create statewide weed awareness campaign. (CALIWAC Ed Comm)

Develop standardized training tools and presentations for educators resource management personnel and weed control practitioners, etc. (CINWCC, CALIWAC, UCCE, Cal-IPC, CWSS, Resource Agencies)

Make a list of outreach cooperators and engage them. (CALIWAC Ed Comm)

Strengthen participation in the education and awareness committee of CALIWAC to bring more coordination and planning efforts in CA. (CaliWAC) (Resource Agencies)

Develop accessible photo banks. (CDFA, UCD)

Funding and Resources

Funding for all phases of noxious and invasive weed management is chronically inadequate statewide. The current rate of spread of major weeds and the introduction of new species is far outstripping our ability to contain them. The problem is most acute in counties with sparse populations and small private land bases resulting in a low tax base. Furthermore, federal funding is still far from sufficient to deal with the extent and scope of the problem on the nearly 45 million acres of federal land in California. Funding is most deficient at the local level.

Current Program

The CALIWAC has taken on increasing funding as one of its top goals. This weed plan is one part of the effort to clearly identify needs for additional resources.

Comprehensive Needs

Outreach & Education

Economic analyses of ecological and agricultural impacts, and cost-benefit analyses of prevention and control programs.
Web-based clearinghouse for funding information.
Comprehensive budget, with funding gaps identified.
Additional innovative funding sources.
Private resources to support research.
More informed grant-making foundations/agencies.

Legislative

Legislation to continue base funding for WMAs.
Funding for "rapid response" to emergency infestations.
Analysis of multi-agency "crosscut" budget.
Relationships with critical legislative members and staff at all levels.
Advocacy effort to support needed funding.
Position to acquire federal funds for state projects.
Steady funding for development of biological control agents.
Analysis of local assessment districts.

Coordination

Staff positions (local and statewide) for WMA coordination.
Partnerships to obtain federal funds.
Agency integration for regulatory compliance to conserve funds.
Partnership with landowners, local "work groups" through Farm Bill Programs.

Selected Actions

Outreach & Education

Research funding gaps and develop comprehensive budget, analyzing the potential for a “crosscut” budget. (CINWCC, CALIWAC)
 Create a web-based clearinghouse for information on granting agencies. (CDFA, CALIWAC, WeedRIC)
 Develop grant application templates. (CDFA, WMAs, CALIWAC)
 Encourage WMAs to have projects written up and ready to go. (CDFA, WMAs)
 Perform a broad economic analysis of the ecological and agricultural impact of weeds in California. (ERS, NRCS, UCCE, USDA-ARS)
 Strengthen participation in the Funding and Resources Committee of CALIWAC, and a more influential support base for seeking funds. (CALIWAC)
 Develop a marketing plan to increasing the awareness of grant-making foundations. (CALIWAC)

Legislative

Formulate a request for funding for CALIWAC. (CALIWAC)
 Formulate a request for funding for a WMA coordinator(s). (CALIWAC)
 Conduct field tours for legislators. (CALIWAC, WMAs)
 Renew funding for WMAs by supporting state and federal bills. (CALIWAC)
 Analyze effectiveness of a surcharge on non-native nursery stock. (CALIWAC)
 Formulate request for establishing a rapid-response emergency fund. (CINWCC, CALIWAC)
 Analyze competitive funding issues and formulate solutions that promote equitable and adequate funding for all participants. (CALIWAC, WMALC)
 Analyze effectiveness of a statewide fee on interstate commerce. (CALIWAC)
 Advocate for executive branch buy-in for budget needs. (CALIWAC)
 Plan a presentation on Pest Abatement Districts as a mechanism for local funding as part of the WMA annual meeting. (WMAs, CDFA)
 Coordinate grassroots advocacy for funding for weed programs. (CALIWAC)
 Analyze possibility of having weed programs appear as a voluntary contribution option on 1040 Form. (CALIWAC)
 Analyze potential effectiveness of a tax on vehicles. (CALIWAC)
 Analyze potential effectiveness of a mill tax assessment on herbicide sales. (CALIWAC)

Coordination

Coordinate with NRCS to obtain significant Farm Bill EQIP/WHIP—funds for WMAs. (NRCS, RCDs, WMAs)
 Coordinate on the national level for federal funding. (CALIWAC)
 Promote cost-share programs that encourage participation in weed control from private landowners. (NRCS, CDFA, WMAs)
 Formulate proposal for agency staffing improvements. (CALIWAC, CINWCC)
 Establish a contact in each of the six CDFG regional offices. (CALIWAC, CINWCC)

Enforcement and Compliance

California has some of the most extensive regulations for the prevention and control of noxious weed species. These regulations have provided the legal structure for the successful prevention of invasion of many highly deleterious weeds into California. The California Agricultural Code is the foundation of our weed laws. Further regulations are created and developed through the rulemaking protocol. Procedures and policies are developed at the Departmental level to make certain procedures and activities transparent and uniform. The County Agricultural Commissioners carry out much of the inspection and enforcement work at the county level and play a large role in helping to develop standard enforcement procedures and activities.

The issues involving non-noxious invasive weeds have grown larger in the past five years. There is not clear agency leadership or authority concerning non-noxious invasive weeds. An especially concerning problem is the sale and planting of weeds that are know to be invasive and damaging to natural ecosystems. There is almost a universal desire for voluntary and not regulatory approaches to be used to stop these activities, however coordinated programs are only now being put together to run the necessary education project. Funding for this project has not been secured.

While the preferred method of encouraging people to control weeds is through education and incentives there are limits to the effectiveness of these methods. California does not have a “weed law” that outlaws the presence of certain weeds on private property. There are abatement authorities which can be use to enforce the removal of weeds under certain specific situations.

Current Program

Summary of current regulatory structure for weeds California will be summarized below:

Comprehensive Needs

Non-noxious weeds	Clear authority for regulation and control of weeds that are not primarily agricultural. Ability for localities to ban sale of some species. An official list of weeds that are not primarily agricultural. Reduction in the sale and promotion of invasive ornamentals. Reduction in mail-order and web sales of invasive ornamentals. More awareness of weeds by growers, nurseries, and gardeners.
Awareness of regulations	More awareness of the need for weed regulations. More awareness of how existing regulations work. Collaboration with fire safety councils to promote noxious weed control.
Improve Regulations	Collaboration with interest groups threatened by weeds to advocate for funding and government action. Adequate personnel and funding for enforcement. A formal regulatory framework for weed-free forage program. Incentives for compliance. Improved quarantine and control programs for non-natives. Collaboration between CDFA and outside organizations to develop weed ratings. Reasonable, not burdensome, regulatory process. More timely evaluation of “Q” ratings.

Selected Actions

Non-noxious weeds	<p>Create a nursery task force of the important interests to develop voluntary guidelines on safe practices. (Cal-IPC, CACASA, CAN)</p> <p>Publish alternative plant lists of desirable and benign replacements for invasive ornamentals. (Cal-IPC, CACASA, CDFA)</p> <p>Identify incentives for selling safe species(green certification). (Cal-IPC/CACASA)</p> <p>Identify the agency to take on authority for non-agriculturally important weeds. (CALIWAC)</p> <p>Finalize and promote county level model ordinance to ban weeds. (CDFA, CACASA)</p> <p>Encourage local boards of supervisors to pass resolutions against local problem weeds. (CALIWAC)</p> <p>Develop speakers list and poster on ornamental weed issues. (Cal-IPC)</p> <p>Invite nursery industry to join CALIWAC. (CALIWAC)</p> <p>Create the authority to regulate and control non-agricultural weeds. (CALIWAC)</p> <p>Finalize a list of non agricultural weeds detrimental to California and prioritize. (Cal-IPC)</p>
Noxious Weeds	<p>Create a guide on authorities and options in California to regulate/abate weeds. (CDFA, CACASA)</p> <p>Explore feasibility of California legislation to formalize weed free forage. (CALIWAC)</p> <p>Investigate diverting fine money back to enforcement. (CALIWAC, CACASA)</p> <p>Review existing state law and code on management on weeds and suggest new laws if appropriate. (CINWCC)</p> <p>Study the authority, implementation and public response to mandatory fuel/ fire abatement programs in southern California. (CALIWAC)</p> <p>Publish a guide explaining the process for listing a species on the noxious weed list. (CDFA, CACASA)</p>

The RMAC Strategic Plan

The problem with noxious weeds and the need for action were discussed by the California Range Management Advisory Committee's (RMAC) Noxious Weed Subcommittee, and resulted in a publication in 1999 entitled "Strategic Plan For The Coordinated Management Of Noxious Weeds In California" and can be found at: <http://www.cdfa.ca.gov/phpps/ipc/noxweedinfo>
The goals of this Strategic Plan for the coordinated management of noxious weeds were to:

- 1) Increase the profitability and value of cropland and rangeland.
- 2) Decrease the costs of roadside, park, and waterway maintenance.
- 3) Reduce fire hazard and fire control costs in the state.
- 4) Protect and enhance the biodiversity of California ecosystems.

The strategic plan was very successful in promoting the benefits of cooperative action in weed management and served as practical vision for two pieces of legislation (AB1168, in 1999 & SB1740, in 2000) which provided \$5.4 million in pilot funding for Weed Management Areas in California. Between 1998 and 2003 the number of county-based Weed Management Areas has increased from 6 to 45 in the state.



California Interagency
Noxious Weed Coordinating
Committee
Noxious Times

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